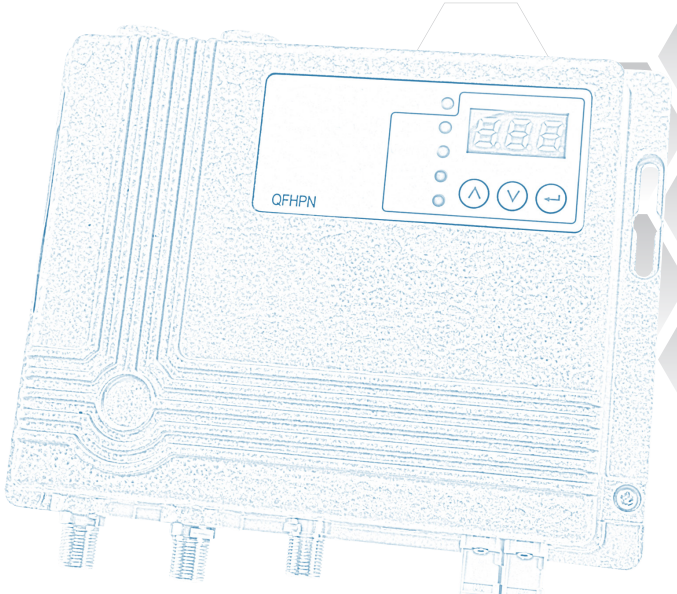
HFC *Enhance*®

D3.1 / CCAP™ Compliant

1.2 GHz

QFHPN High Power Optical Node with AGC

Installation & Operation Manual



Although every effort has been taken to ensure the accuracy of this document it may be necessary, without notice, to make amendments or correct omissions. Specifications subject to change without notice.

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IMPORTANT SAFEGUARDS

1. Important Safeguards

ATX Networks strongly advises you to read the following safety instructions prior to installing and operating this equipment.

- **Read These Instructions First** – All safety and operating instructions should be read before installing or operating this equipment.
- **Retain This User Manual** – Safety and operating instructions must be retained for future reference.
- **Ventilation** – The optical node should be kept at a distance from other objects to keep from overheating. **Maximum operating ambient temperature is 131°F (55°C).**
- **Power Sources** – The mains circuit should be a dedicated, un-switched supply. Keep the unit away from high voltage or other interference creating devices such as motors, compressors, etc.

CAUTION: *For continued protection against risk of fire, replace circuit breakers/fuses (if necessary) with one of only the same type and rating.*

OPTICAL OUTPUT SAFETY: *Optical compact node units may emit harmful invisible laser radiation if powered on and the case is opened or the beam path is exposed.*

The ATX Networks' QFHPN compact node is classified as Class 1M per IEC/EN 60825-1/A2:2001. This product complies with FDA/CDRH, 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 dated 26 July, 2001.

Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers and Miniscopes) within a distance of 100 mm may pose an eye hazard.

Laser power up to 26 mW at 1310 nm could be accessible if optical connector is open or fiber is broken. Lasers are Powered ON whenever the unit is powered.

CAUTION: *Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure.*

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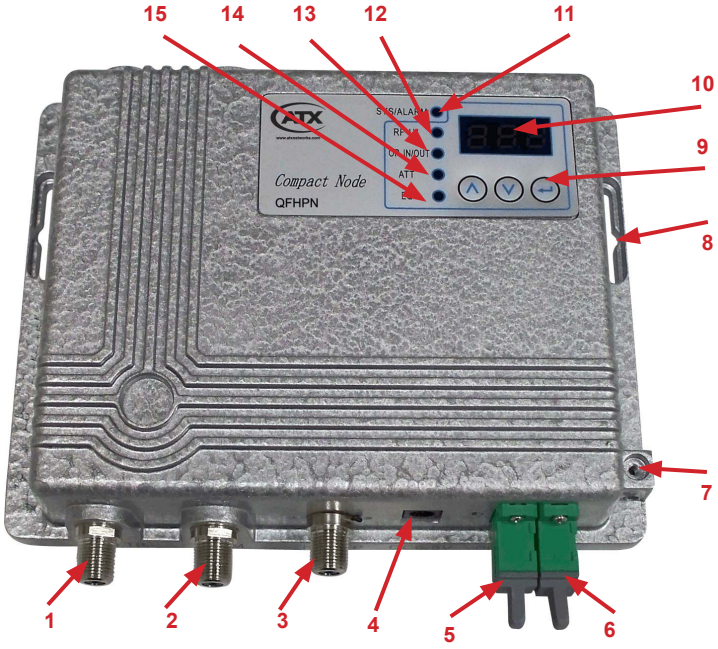
INSTALLATION AND OPERATION

2. Installation and Operation



1. Downstream RF output level test port (-20dB)
2. Downstream RF output / Upstream RF input
3. Upstream RF test port (-20dB)
4. Power input +5~+8VDC
5. Upstream fiber output
6. Downstream fiber input
7. Grounding lug and screw
8. Mounting screw slot
9. Control buttons
10. 3-digit Status display
11. Power ON /alarm LED
12. Mode LED RF LEVEL power
13. Mode LED Optical in/out power
14. Mode LED Attenuation settings
15. Mode LED Equalization settings (tilt)

Figure #1 – QFHPN 2-way Compact Node

1. Downstream RF output port 1
2. Downstream RF output port 2
3. Downstream fiber input
4. Power input +5~+8VDC
5. Grounding lug and screw
6. Mounting screw slot
7. Control buttons
8. 3-digit Status display
9. Power ON /alarm LED
10. Mode LED RF LEVEL
11. Mode LED Optical in/out power
12. Mode LED Attenuation settings
13. Mode LED Equalization settings (tilt)

Figure #2 – QFHPN 1-way Receive Only Compact Node

2.1 Installation

The ATX Networks QFHPN compact node is designed to operate in a utility room or closet. It must be placed in a location where it will not be directly exposed to liquid or to extreme temperatures. **Please refer to Figure 1 or Figure 2 above (depending on model being installed) for installation and operation.**

2.2 Mounting

The compact node is designed to be mounted directly on a wall or other indoor surface. It should be placed so an operator can view the status display for installation or troubleshooting. Attach the compact node to a wall board with the connectors facing downward. Use appropriate mounting hardware (not included) for the surface you are mounting it on. The slots on the compact node will accommodate screw type fasteners from sizes #8 to #12.

2.3 Grounding

The compact node should be grounded to electrical/utility ground using at least #10 solid ground wire. This will minimize the risk of electrical shock and minimize the effect of noise on the coax cable inside the building. Follow all electrical codes and standards that apply when installing this equipment.

2.4 Connecting COAX

Connect the building video coax wire to the output of the CATV compact node. For best results the building should use RG6 coax cable or better with as short of runs as possible. The compact node is designed to output 40dBmV of RF power (44 dBmV x2 on QFHPN-D44), and includes the ability to compensate for long distance coax runs if long runs cannot be avoided. Be sure that all electrical couplers are of the 2-way type, or poor performance will result with cable modems and some set-top boxes. When attaching the coax cable to the CATV compact node, use appropriate tools – do not over tighten or you may damage the node. A loose or damaged coax connection may also result in poor signal stability as temperature changes over time.

2.5 Connecting Optical Fibers

CAUTION: *NEVER look into the ends of a fiber optic cable that is connected to the network!! Communications systems use lasers that emit invisible infrared light, which can do permanent damage to your eyes.*

Other general recommendations:

- Use only Single Mode Fiber (SMF) optic cable (9/125µM). Multi-Mode Fiber (MMF) is incompatible with the equipment and will result in unacceptable performance and possible damage to the equipment.
- All fiber splices should be fusion-type splices. Avoid mechanical or compression type connections.
- Insure that you follow local practices when working with fiber optic cable as tight bends or excessive pulling on the fiber jumpers may damage the cable.
- For optimum performance, fiber runs should be made directly from the transmitter to the receiver. Minimize the use of adapters, patch panels and additional points of failure and signal loss.
- In order to ensure return loss is maximized, use only SC/APC connectors. Clean and inspect connectors and fiber end-faces prior to installation, and every plug in/out cycle.
- Use only industry approved methods, materials, and solutions for cleaning.
- Do not turn on the transmitter alone or without a protector cover at the unit connector end, otherwise the laser can do harm, especially to eyes. This is especially critical because the laser is invisible.
- Always turn off the laser prior to making connections to the transmitter. Failure to do so may cause irreparable damage to the laser and transmitter.

Attaching the fibers to the CATV compact node:

- Before connecting the optical fiber to the CATV compact node, inspect and clean the optical connector before connecting the optical network jumper.
- Insert the forward path fiber into the correct connector and confirm that the cable “snaps” into place.
- Clean and inspect the upstream return path connector on the compact node and connect the return path fiber jumper. Confirm that the return path connector “snaps” into place (QFHPN-2W only).

POWER UP AND TEST

3. Power Up and Test

The compact node is now ready for power up.

3.1 Connect the Power Adapter

Insert the 5mm power plug from the power converter into the power port of the compact node and plug the adapter into the 120VAC wall outlet.

The compact node will conduct a self-test and the power LED will be flashing. As the test proceeds each of the mode LEDs are lit in sequence. When the self test is complete, the output power LED is lit, and the display shows the current RF output power level.

A green power LED indicates that the unit is operating correctly and the RF output is within acceptable limits. (See alarm indicator section if the SYS/ALARM LED is not showing green).

Secure the low voltage cable from the compact node such that it does not become easily tangled or dislodged.

3.2 Verify Signal Levels

The compact node is equipped with a built in power meter for the RF output and the optical input/outputs. Use the arrow control keys to select the values you want to view as follows:

3.2.1 Check RF Power Output Level

Use the arrow control buttons to select the RF LEV mode. (When the compact node completes its initial diagnostics, it will automatically be selected). The display indicates the RF output power, measured in dBmV/Ch. Note that the attenuation setting will directly affect the output power value for the compact node.

- Using an RF Signal Meter, confirm the RF downstream power level output. The output level should be approximately +40dBmV per channel with an optical input of from -8 to +1dBmV.
  - The RF level can also be measured from the RF output test port. The level at the test port will be approximately 20 dB below the actual RF output level.

3.2.2 Check Optical Power Receive and Optical Output Levels

Use the arrow control buttons to select the OP IN/OUT mode. Both the input and the output optical power levels can be viewed. Enter the OP IN/OUT mode by pressing the down arrow and the display shows the optical input power from the network. The value on the display is shown in dBm, and should be between -9 and +1. (The ideal setting is -3)

Pressing the down-arrow button again shows the upstream optical output power level being generated by the compact node, also measured in dBm. This value should measure between 0 to +2.

- Using an Optical Power Meter, verify that the downstream (forward path) signal on the fiber cable coming from the head-end is between -9 and + 1 dBm.
- Using an Optical Power Meter, verify the upstream output of the compact node (return path) is between 0 and +2dBm (QFHPN-2W only).

3.2.3 Check the Upstream RF Power Level (QFHPN-2W only)

The compact node has no direct measurement of the upstream RF power it is receiving. You will need to confirm the received RF power from a cable modem at the head-end, or at the RF test port on the CATV compact node.

- Using an RF Signal Meter, verify the RF input to the compact node is between+23 dBmV and +35dBmV. The measurement at RF upstream input test port will be 20 dB below the actual input level.

3.3 Fine-tuning the Compact Node to the RF Network

In some cases, the output of the compact node may need to be adjusted. The compact node has built-in attenuation and equalization features that allow you to optimize the system.

3.4 Changing the RF Attenuation

The attenuation feature allows you to reduce the RF output into the coax network in the case where overdriving is being experienced. Attenuation can be applied in 1dB increments up to a maximum of 16db as follows:

1. Using the arrow button, select the “ATT” mode. The current attenuation setting will be displayed.
2. Press and hold the return button until the display starts to blink.
3. Use the arrow buttons to change the value shown on the blinking display to a desired value.
4. Click the return button to set the attenuation value into memory. The display stops blinking.

The RF output level has now been changed and set.

3.5 Changing the RF Equalization

The Equalization feature allows you to change the tilt on the RF output to compensate for the losses in the coax cable. High frequency channels tend to be attenuated by the cable more than the low frequency channels. Changing the tilt attenuates the lower channels but not the high channels to overcome the cable loss issues. The attenuation can be applied in 1dB increments up to a maximum of 16 as follows:

1. Using the arrow button, select the “EQ” mode. The current tilt setting will be displayed.
2. Press and hold the return button until the display starts to blink.
3. Use the arrow buttons to change the value shown on the blinking display to a desired value.
4. Click the return button to set the equalization value into memory. The display stops blinking.

The RF tilt has now been changed and set.

SPECIFICATIONS

4. Specifications

SPECIFICATIONS	QFHPN
RECEIVER (Forward Path)	
WAVELENGTH	1260-1620nm
OPTICAL INPUT POWER RANGE	-9 to +1 dBm (8 dB optical AGC range)
FREQUENCY RANGE	54-1000 MHz
FREQUENCY RESPONSE	± 1.5 dB (54-1000 MHz)
RF OUTPUT POWER	+40, +44 dBmV (at 0 dBm optical input, +44 dBmV applies to dual RF output model only)
TILT	0-12 dB (54-550 MHz, 1 dB steps)
RF ATTENUATION	0-16 dB (1 dB steps)
CARRIER-TO-NOISE RATIO	51 dB (78 channel loading, 0 dBm input)
COMP. 2nd ORD.	-60 dBc (78 channel loading, 0 dBm input)
COMP. TR. BT.	-60 dBc (78 channel loading, 0 dBm input)
RF TEST POINT	-20 dB (referenced to output)
TRANSMITTER (Optional Return Path)	
WAVELENGTH	1310nm ± 20
OPTICAL OUTPUT POWER	+1 dBm (± 1 dB)
RF FREQUENCY	5-42 MHz
RETURN PATH RF INPUT POWER	+22 to +35 dBmV
FREQUENCY RESPONSE	± 0.75 dB (5-42 MHz)
RF TEST POINT	-20 dB (referenced to input)
ELECTRICAL & ENVIRONMENTAL	
DC POWER	5-8 VDC
TOTAL POWER CONSUMPTION	< 6.5 watts
AC POWER ADAPTER	AC Adapter, 120 VAC to 5 VDC
DC POWER INPUT RANGE	40-60 VDC
OPERATING TEMPERATURE	-10ºC to +55ºC (+14ºF to +131ºF)
HUMIDITY	5-95% Non-condensing
DIMENSIONS	1.42"H x 6.43"W x 5.45"D (3.6H x 16.3W x 13.8D cm)
WEIGHT	1.1 lbs (0.5 kg)

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SERVICE & SUPPORT

5. Service & Support

5.1 Contact ATX Networks

Please contact ATX Technical Support for assistance with any ATX products. Please contact ATX Customer Service to obtain a valid RMA number for any ATX products that require service and are in or out-of-warranty before returning a failed module to the factory.

TECHNICAL SUPPORT
Tel: (905) 428-6068
Toll Free: (800) 565-7488 (USA & Canada only)
► Press *3 for **Technical Support**
►Then press 1 for **Digital Video Products (DVIS, DigiVu, UCrypt, etc.)**
►OR, press 2 for **All Other Products**
Email: digitalvideosupport@atxnetworks.com for **Digital Video Products**
Email: jleskovar@atxnetworks.com for **All Other Products**

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ATX Networks
1-501 Clements Road West
Ajax, ON L1S 7H4 Canada

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Toll Free: (800) 565-7488 (USA & Canada only)
► Press *1 for **Customer Service**
Fax: (905) 427-1964
Toll Free Fax: (866) 427-1964 (USA & Canada only)
Web: www.atxnetworks.com
Email: support@atxnetworks.com

5.2 Warranty Information

The ATX Networks QFHPN has a one year warranty and is subject to ATX Networks' standard warrantee terms. There are no user serviceable components inside the unit. The warranty is void if the unit is opened or is damaged due to misuse.

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